

REMARKS

Claims 25 and 28-40 are pending for the Examiner's review and consideration.

Claim 39 has been amended to recite a gas injector body including a plurality of gas outlets adapted to supply process gas into the processing chamber, the gas outlets including a center gas outlet extending in the axial direction and a plurality of angled gas outlets extending at an acute angle to the axial direction, wherein the gas outlets are located in the axial distal end surface of the gas injector body. Support for Claim 39 can be found in Claim 25. As no new matter has been introduced by this amendment, it should be entered at this time.

Submitted herewith is an Information Disclosure Statement to make of record the newly cited Ishii, Li and McMillin patents cited in the final Official Action. An additional patent to Maydan is included therein.

Claims 25, 29, 33-34 and 37-38 were rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over U.S. Patent No. 5,685,942 ("Ishii") in view of U.S. Patent No. 5,772,771 ("Li"). The reasons for the rejection are set forth in numbered paragraph 2 at pages 2-4 of the Official Action. Specifically, the Official Action alleges that it would have been obvious to change the angle of a plurality of the parallel gas outlets disclosed in Ishii to an acute angle as disclosed by Li. This rejection is respectfully traversed.

Reconsideration of the rejection is requested in view of the following legal precedent regarding rejections based on a combination of prior art references. First, in In re Vaeck, 20 USPQ2d 1438, 1442 (Fed. Cir. 1991), the court stated the following regarding a proper §103 rejection:

"Where claimed subject matter has been rejected as obvious in view of a combination of prior art references, a proper analysis under §103 requires, *inter alia*, consideration of two factors: (1) whether the prior art would have suggested to those of ordinary skill in the art that they should ... carry out the claimed process; and (2) whether the prior art would have also revealed that in so making or carrying out, those of ordinary skill would have a reasonable expectation of success [citation omitted]. Both the suggestion and the reasonable expectation of success must be found in the prior art, not in applicant's disclosure." (Vaech at 1442.)

In addition to the above, In re Keller, 642 F.2d 413, 425, 208 USPQ 871, 881 (CCPA 1981) set forth the following regarding a proper combination of references:

"The test for obviousness is not whether the features of a secondary reference may be bodily incorporated in the structure of the primary reference...Rather, the test is what the combined teachings of those references would have suggested to those of ordinary skill in the art."

Claim 25 recites a gas injector for supplying process gas to a plasma processing chamber wherein a semiconductor substrate is subjected to plasma processing, the gas injector comprising a gas injector body sized to extend through a chamber wall of the processing chamber such that an axial distal end surface of the gas injector body is exposed within the processing chamber, the gas injector body including a plurality of gas outlets adapted to supply process gas into the processing chamber, *the gas outlets including a center gas outlet extending in the axial direction and a plurality of angled gas outlets extending at an acute angle to the axial direction*, wherein the gas outlets are located in the axial distal end surface of the gas injector body. As set forth below, the combination of references fails to teach or reasonably suggest all of the claim limitations.

Ishii Discloses a Showerhead with Parallel Supply Ports

Ishii discloses a plurality of supply ports 87 below a hollow portion 86 of a ground electrode 85 of a showerhead (See column 7, line 63-column 8, line 15 and Figure 4).

However, Ishii does not disclose an injector having a plurality of angled gas outlets.

Considered in its Entirety Ishii Would Lead Away from the Claimed Invention

A prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention. *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 202 (Fed. Cir. 1983), *cert. denied*, 469 U.S. 851 (1984). Ishii discloses ports 87 which are parallel to each other in order to blow gas on a semiconductor wafer which opposes the ports 87 (column 8, lines 31-36). As such, Ishii teaches away from an injector having both a center gas outlet and a plurality of angled gas outlets.

Li Discloses a Gas Nozzle with Orifices Only at an Acute Angle

Li was cited for disclosing a gas nozzle comprising a plurality of angled gas outlets 56a (See Figure 1A). However, Li does not relate to a gas injector having a gas injector body sized to extend through a chamber wall. Instead, Figure 1a of Li shows a gas feed arrangement wherein a central feed tube feeds gas into an enlarged plenum having conically shaped nozzles 56a extending therefrom. The gas nozzle of Li comprises only angled outlets whereas Ishii provides an injector having only parallel supply ports. Neither Li nor Ishii suggests an injector having both a center gas outlet and a plurality of angled gas outlets as required by Claim 25.

Lack of Motivation and Impermissible Hindsight

As discussed above, the Official Action has not set forth a tenable basis establishing the requisite motivation to combine Ishii with Li in a manner that would produce the claimed injector. Ishii and Li provide no motivation to combine in a single gas injector a center gas outlet extending in the axial direction and a plurality of angled gas outlets extending at an acute angle to the axial direction. Thus, the Official Action relies on impermissible hindsight in an attempt to combine the references to produce the claimed injector.

In view of the foregoing, Applicants respectfully submit that Claim 25 and all the claims dependent therefrom are clearly patentable over the combination of Ishii and Li.

Claims 28, 30-32, 35-36 and 39-40 were rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over Ishii and Li in view of U.S. Patent No. 6,013,155 ("McMillin"). The reasons for the rejection are set forth in numbered paragraph 3 at pages 4-6 of the Official Action. McMillin was cited for disclosing an O-ring seal between the gas injector and the chamber wall and for providing process gas to the chamber at sonic velocity. However, Claims 28, 30-32 and 35-36 depend from Claim 25 and thus are patentable for at least the reasons that Claim 25 is patentable over Ishii and Li.

Independent Claim 39 recites a gas injector for supplying process gas to a plasma processing chamber wherein a semiconductor substrate is subjected to plasma processing, the gas injector comprising (i) gas injector body sized to extend through a chamber wall of the processing chamber such that an axial distal end surface of the gas injector body is exposed within the processing chamber, the gas injector body including a plurality of gas

outlets adapted to supply process gas into the processing chamber, the gas outlets including *a center gas outlet extending in the axial direction and a plurality of angled gas outlets extending at an acute angle to the axial direction*, wherein the gas outlets are located in the axial distal end surface of the gas injector body; (ii) an annular flange adapted to overlies and contact an outer surface of the chamber wall; and (iii) a first O-ring seal in a surface of the flange for sealing against the outer surface of the chamber wall.

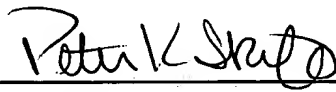
At least for the reasons discussed above, Applicants submit that Claim 39 is patentable over the combination of Ishii, Li and McMillin. Thus, Applicants submit that Claims 39-40 are clearly patentable over the of Ishii, Li and McMillin.

It is submitted that the differences between the claimed subject matter and the prior art are such that the claimed subject matter, as a whole, would not have been obvious at the time the invention was made to a person having ordinary skill in the art.

In view of the foregoing, it is submitted that the present application is in condition for allowance and such action is earnestly solicited.

Respectfully submitted,

BURNS, DOANE, SWECKER & MATHIS, L.L.P.

By: 
Peter K. Skiff
Registration No. 31,917

P.O. Box 1404
Alexandria, Virginia 22313-1404
(703) 836-6620

Date: April 10, 2003

Appendix A - Attachment to Amendment dated April 10, 2003
Marked Copy: Claim 39 (As Amended)

39. (As Amended) A gas injector for supplying process gas to a plasma processing chamber wherein a semiconductor substrate is subjected to plasma processing, the gas injector comprising:

gas injector body sized to extend through a chamber wall of the processing chamber such that [a] an axial distal end surface of the gas injector body is exposed within the processing chamber, the gas injector body including a plurality of gas outlets adapted to supply process gas into the processing chamber, the gas outlets including a center gas outlet extending in the axial direction and a plurality of angled gas outlets extending at an acute angle to the axial direction, wherein the gas outlets are located in the axial distal end surface of the gas injector body;

an annular flange adapted to overlie and contact an outer surface of the chamber wall; and

a first O-ring seal in a surface of the flange for sealing against the outer surface of the chamber wall.